

### **REMARKS**

Applicant respectfully requests reconsideration. Claims 11-15, 20-37, 39-42 and 45-48 were previously pending in this application. Claims 49-52 have been added. The new claims are supported in the specification. No new matter has been added. Claims 11-15, 20-37, 39-42 and 45-52 are now pending for examination, with claims 11 and 32 being independent claims.

#### **Rejection of Claims 11-15, 20-37, 39-42 and 47-48**

Claims 11-15, 20-37, 39-42 and 47-48 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,028,556 (Chang) in view of U.S. Patent No. 4,469,527 (Sugano) and further in view of U.S. Patent No. 5,298,452 (Meyerson). Applicant respectfully traverses this rejection.

The Office Action states that it would have been obvious to one of ordinary skill in the art to modify the Chang process with Sugano's thermal neutron irradiation step.

Chang discloses a process for forming a CMOS device that includes a source and drain regions (29, 30) formed respectively within graded regions (22a, 22b).

Sugano's thermal neutron irradiation step generates lattice defects which render the entire substrate semi-insulating (See Abstract). The Sugano process subsequently forms a semiconductor region at the top surface of substrate by laser annealing. Device features may be formed in the semiconductor region.

It is unclear at what point the Office Action intends to modify the Chang process to include the thermal neutron irradiation step of Sugano. However, in any case, Chang and/or Sugano teach away from this modification.

If the Chang process was modified to include the irradiation step after formation of the device features, the resulting device would be rendered inoperable. The irradiation step would cause the entire substrate to become semi-insulating which would prevent the device from conducting charge and, thus, functioning.

If the Chang process was modified to include the irradiation step prior to the formation of the device features, then the effect of the irradiation step (i.e., to form a semi-insulating substrate) would be eliminated by the high temperatures used in the Chang process to form the device features. The Chang process involves heating the substrate to about 1050 °C to form

graded junctions (22a, 22b) in which the source and drain are formed. (Emphasis added). (See Column 3, lines 35-40). Sugano states that “the temperature of the semi-insulating substrate *must be kept below 600 °C* because if the substrate is heated to a too high temperature during the process, the lattice defects of the entire substrate will be extinguished and the semi-insulating properties thereof will be lost”. (Emphasis added). (See Column 3, lines 1-6). Sugano even specifically states that it is not possible to use a high temperature diffusion step, as done in the Chang process, after the irradiation step. (See Column 5, lines 33-36).

Because Chang and/or Sugano teach away from being combined with one another regardless of when the Chang process is modified to include the Sugano irradiation step, one of ordinary skill in the art would not have been motivated to combine Chang and Sugano.

Applicant also respectfully disagrees that one of ordinary skill in the art would have been motivated to modify the combination of Chang and Sugano to include the Meyerson epitaxial growth process for reasons of record in connection with the Chang and Meyerson combination (See Amendments filed on July 23, 2003 and January 22, 2004). Namely, one would not have been motivated because of the difficulties (e.g., stringent process conditions including very low pressures; complex non-conventional apparatus) of performing the Meyerson epitaxial growth process and the lack of need for precise control over epitaxial layer uniformity in either Chang’s or Sugano’s device

Because there is a lack of motivation to combine the references as stated in the Office Action, a *prima facie* case of obviousness has not been met for claims 11-15, 20-37, 39-42 and 47-48.

Applicant also respectfully disagrees with the assertion in the Office Action that the combination of Chang in view of Sugano and further in view of Meyerson would inherently produce a silicon layer having a different crystalline orientation than the substrate as recited in dependent claim 27 and independent claim 32 for reasons of record as previously argued in connection with the Chang and Meyerson combination (e.g., See amendment filed July 23, 2003). Namely, there is no reason to believe that, under the Meyerson growth conditions, the deposited layer would have a different orientation than the substrate as claimed, even if the layer is deposited on a substrate that includes defects. Therefore, the Office Action has not established the necessary burden required to support an inherency rejection. Thus, even if the references

were combined in the manner stated in the Office Action, claim 27 and independent claim 32 ( as well as its dependent claims) are still be patentable over the combination.

For at least the above reasons, Applicant respectfully requests withdrawal of the claim rejections on this ground.

Rejection of Claims 11-15, 20-37, 39-42 and 45-48

Claims 11-15, 20-37, 39-42 and 45-48 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chang in view of Sugano and further in view of U.S. Patent No. 5,378,651 (Agnello).

For reasons noted above, because Chang and/or Sugano teach away from being combined with one another, one of ordinary skill in the art would not have been motivated to combine Chang and Sugano.

Applicant also respectfully disagrees that one of ordinary skill in the art would have been motivated to further modify the Chang and Sugano combination to include the Agnello growth process. As noted above, Sugano teaches away from further processing steps at temperatures of greater than 600 °C. Agnello discloses a pre-baking step as part of the growth process in which the substrate is heated to temperatures between about 800 °C and 1000 °C. (See Column 6, lines 9-15). Thus, the Chang and Sugano combination teaches away from being combined with Agnello.

Because there is a lack of motivation to combine the references as stated in the Office Action, a *prima facie* case of obviousness has not been met for claims 11-15, 20-37, 39-42 and 45-48.

Applicant also respectfully disagrees that the combination of Chang in view of Sugano and further in view of Agnello would inherently produce a silicon layer having a different crystalline orientation than the substrate as recited in claims 27 and 32. There is no reason to believe that the Agnello growth process would deposit a layer having a different orientation than the substrate as claimed, even if the layer is grown on a substrate that includes defects. Therefore, the Office Action has not established the necessary burden required to support the inherency rejection. Thus, even if the references were combined in the manner stated in the

Office Action, claim 27 and claim 32 ( as well as its dependent claims) are still patentable over the combination.

For at least these reasons, Applicant respectfully requests withdrawal of the claim rejections on this ground.

#### Rejection of Claim 20

Claim 20 was rejected under 35 U.S.C. §103(a) as being unpatentable over Chang in view of Sugano, further in view of Meyerson and further in view of U.S. Patent No. 4,584,026 (Wu); or, as being unpatentable over Chang in view of Sugano, further in view of Agnello and further in view of Wu.

Claim 20 depends from claim 1 which is patentable for reasons discussed above. Thus, claim 20 is also patentable.

For reasons noted above, because Chang and/or Sugano teach away from being combined with one another, one of ordinary skill in the art would not have been motivated to combine Chang and Sugano.

Also, for reasons noted above, one of ordinary skill in the art would not have been motivated to modify the Chang and Sugano combination further in view of Meyerson or Agnello.

Applicant also respectfully disagrees that one of ordinary skill in the art would have been motivated to further modify the Chang, Sugano and Meyerson combination, or the Chang, Sugano, Agnello combination to include the teaching of Wu.

Because there is a lack of motivation to combine the references as stated in the Office Action, a *prima facie* case of obviousness has not been met. For at least this reason, Applicant respectfully requests withdrawal of the claim rejections on this ground.

#### New Claims

Dependent claims 49-52 have been added. These claims depend from either independent claim 11 or 32, which patentable for reasons stated above. Therefore, claims 49-52 are also patentable.

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### **CONCLUSION**

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,  
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